







Peter Koch:

## WIZARD OF WOOD USE



If this researcher  
has his way,  
these machines  
and techniques will  
quadruple the  
utilization of woods  
from southern forests

by Mary Elaine Lora

**L**IKE HIS pioneer forefathers, Peter Koch sees opportunity where others see obstacles. And his vision is helping to reshape the wood industry.

Since 1963 Koch has directed research on processing southern woods for the U.S. Forest Service's Southern Forest Experiment Station in Pineville, Louisiana. In that time, he has invented six revolutionary machines, developed techniques for processing wood with less waste and reduced energy requirements, published an authoritative text on southern pine, found uses for low-quality hardwoods once considered worthless and demonstrated how the South can quadruple the wood-products output from its forests.

His achievements reveal the same resourcefulness, the same determination to reach a goal that characterized his immigrant ancestors, who left Denmark to settle first in Mississippi and later in the wild territory of Montana. Peter Koch's goal is this: by 1980 he and his colleagues will develop the technology to recover from each pine twice as much salable product as in 1963 and to profitably use the small, poorly formed hardwoods growing on southern pine sites.

Koch and his team of six wood scientists, six technicians and three secretaries have already made considerable strides toward their goal. For example, in 1963 Koch unveiled the chipping headrig, a machine that squares debarked logs without waste by converting the round sides into pulp chips. Today, over 1,100 chipping headrigs are in use throughout the world. In North America perhaps half the softwood processed is machined by chipping headrigs or edgers.

So significant is the chipping headrig that in 1973 it earned Koch the John Scott Award, presented for inventions deemed most useful to mankind and awarded in the past to such scientists as Madame Curie and Thomas Edison. The machine also won the 1968 Woodworking Digest Award.

Koch's approach is an integrated attack on the problem of expanding the timber resource through technology. He looks at the whole problem, from harvesting to marketing, and proposes innovative solutions.

Realizing that nearly 17 percent of a tree's total weight is in its roots and stump, Koch determined to harvest these parts as well and provided the machine to do it—a tree puller that lifts tree and taproot from the ground together. Seven commercial tree pullers have been built.

To harvest logging slash (tops and branches), standing culls and stumps, Koch and Dan McKenzie of the Forest Service's San Dimas Equipment Laboratory designed a mobile chipper. It not only scoops up such material but also chips it and either lays the chips on the site as mulch or loads them for transport to the mill and conversion to fuel or fiber. During a rotation, the mobile chipper could raise fuel and fiber recovery by 20 to 60 tons per acre. The inventors have enlisted the aid of the Energy Research and Development Administration and six major forest-products firms in building a prototype machine.

As with the mobile chipper, Koch always works closely with industry. "I try to get the manufacturer involved at the earliest stage possible; this is the best way to transfer research findings to industry," he says.

Koch himself worked in industry for nearly 20 years before turning to fulltime research. He began his career in 1946 as an engineer and later assistant to the president of Stetson-Ross in Seattle, operated his own consulting engineering business in Seattle in the 1950's, taught at Michigan State University from 1955 to 1957 and then served as vice-president and director of the Champlin Company, Rochester, New Hampshire, until 1963.

First-hand knowledge of industry's problems has helped Koch to develop much-needed improvements in wood processing. He revolutionized southern pine processing when he showed how to dry studs in 24 hours at 240°F instead of the usual four to six days at 180°F. This accelerated drying schedule is now used throughout the South and in virtually all pine mills in Australia.

The Pineville scientists are work-

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◀ Part of Koch's timber-use approach is machine that first severs lateral roots, then pulls entire tree and taproot from soil like a carrot

ing to further reduce drying time and energy requirements. Twelve-hour drying is possible with a proposed tunnel kiln heated to 270° F. Preliminary studies indicate that short exposure to this high temperature causes no significant decrease in southern-pine strength.

To heat the kiln, Koch and M. T. Jasper of Mississippi State University developed a green-bark burner that dries and burns wet fuel such as logging slash, yielding gases of about 1,600° F. A commercial prototype with an output of 5½ million Btu's per hour is being built by Energex Corporation of North Portland, Oregon. In a typical plant, such a burner might eliminate fuel-oil bills of close to \$100,000 a year.

Pine utilization is only half the problem, however. "For every ton of pine growing on a southern pine site," Koch points out, "there's 0.8 ton of small, low-quality hardwood."

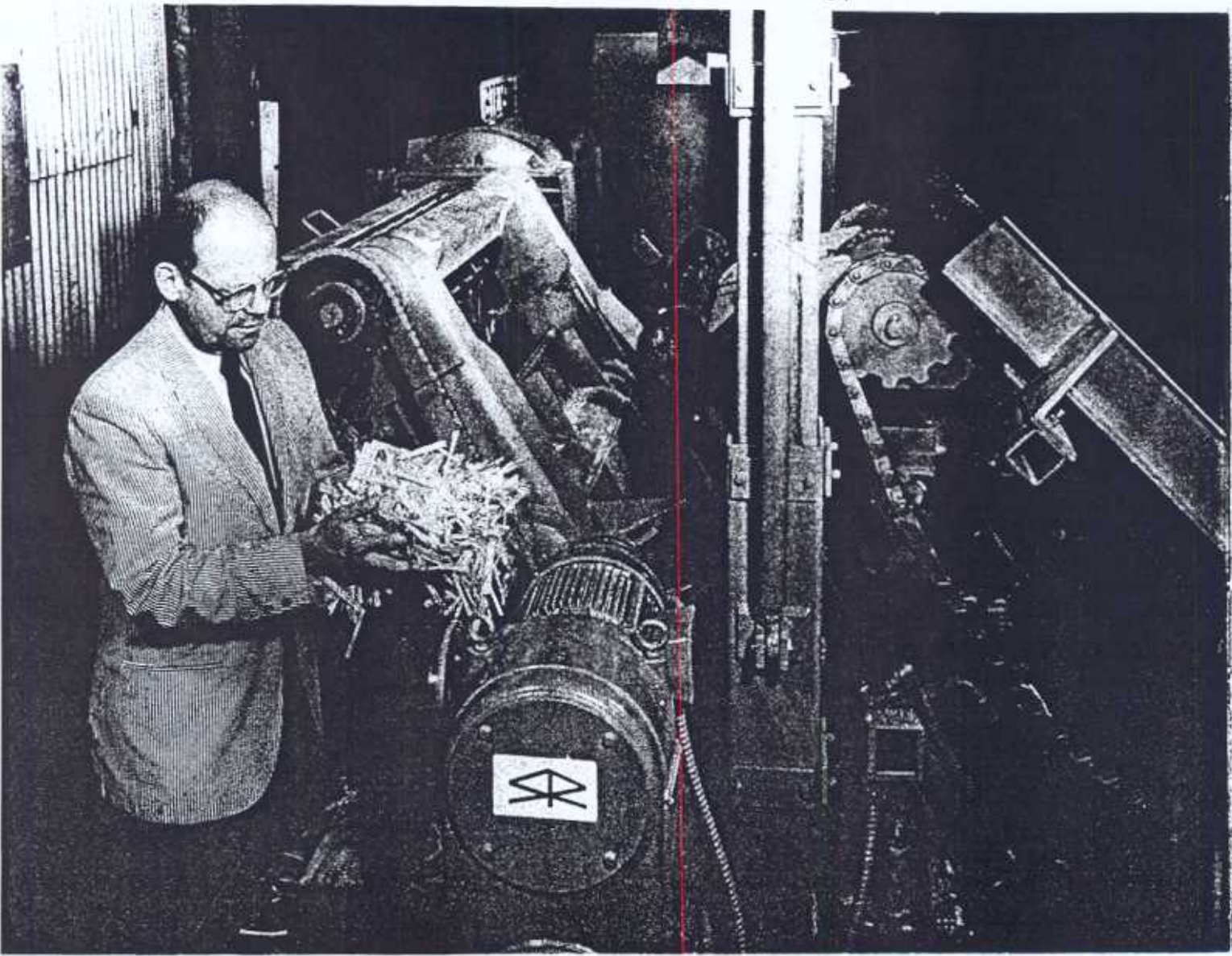
These hardwoods are typically wasted. In fact, destroying them to prepare the site for pine regeneration is one of the major forestry expenses in the South. The key to utilizing pine-site hardwoods may well be Koch's shaping-lathe headrig.

The shaping lathe machines the entire length of a log as it makes a single revolution against the cutterhead. Since the rotating log is held in place by end chucks, the shaping lathe can accept short logs with butt swell, crook, or sweep—logs that before could not be sawn. The first commercial headrig was placed in operation last year by Hinchcliff Products of Parsons, West Virginia. This machine has a 54-inch-long cutterhead. A shaping lathe capable of machining 8½-foot logs is being designed by Stetson-Ross of Seattle and should be available for sale soon.

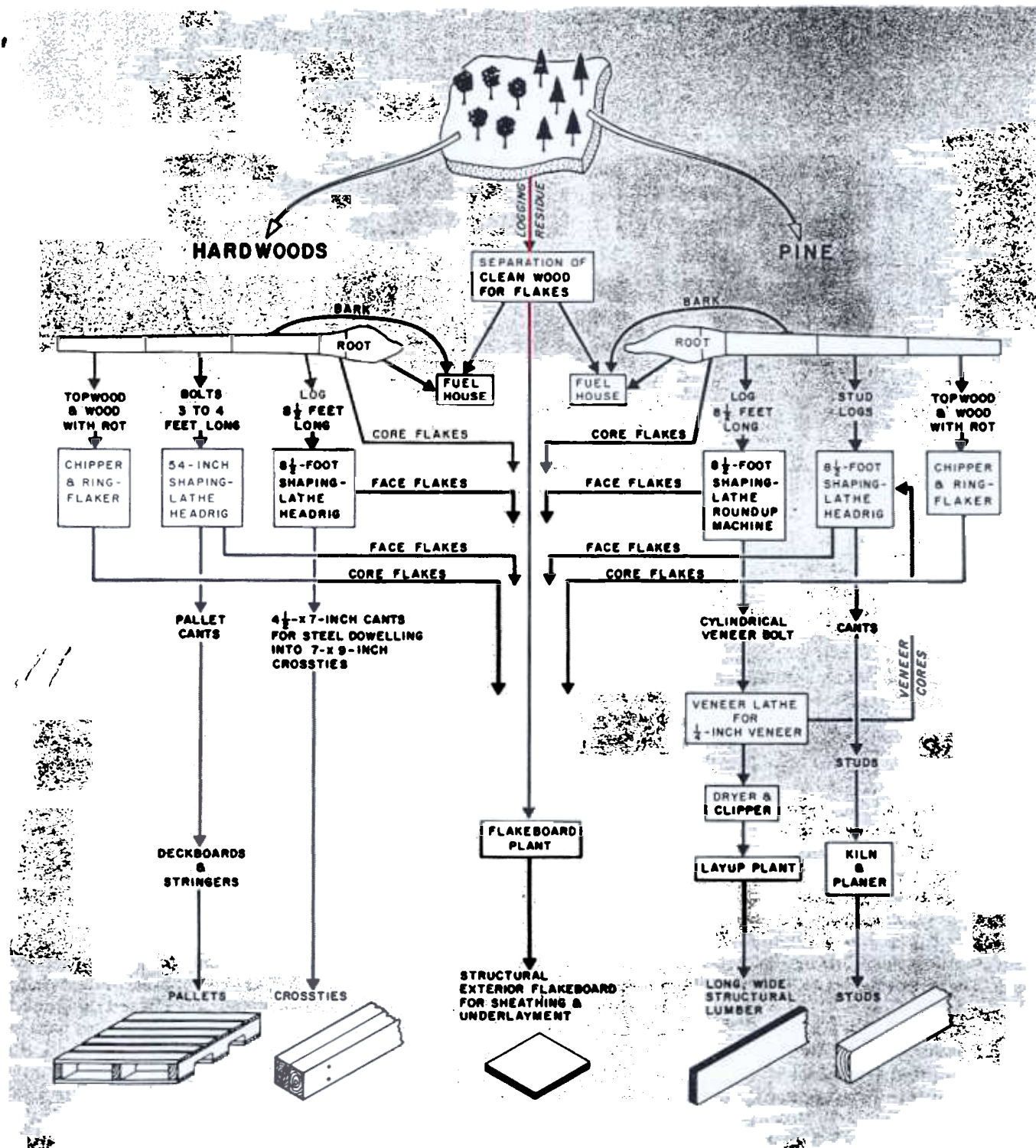
The shaping-lathe headrig opens the door to a host of new, high-value products made from "worthless" hardwoods. For example, mainline 7 x 9-inch crossies can be made from small logs by cutting two 7 x 4.5-inch cants and linking them with steel dowels. Residues from the shaping lathe are flakes ideal for use in structural exterior flakeboard (a new product to compete in price and function with plywood sheathing) or medium-density fiberboard.

Project scientists C.-Y. Hse, Eddie Price and George Woodson have been working with these boards. Hse is formulating required adhesives, and Price is subjecting 4 x 8-foot flakeboard panels to the rigorous exposure and strength tests required by national building codes. Meanwhile, advanced planning is underway for several flakeboard plants to be built in the U.S. Woodson is determining how different

Koch inspects flake residue from his shaping-lathe headrig. Note hardwood bolts in loading position







species mixes and press conditions affect fiberboard's strength and durability.

Other scientists in the project are investigating a variety of topics, ranging from Charles McMillin's mechanical refiner for producing high-strength pine pulp to Richard Hemingway's proposal for obtaining adhesives from pine bark. Floyd Manwiller is characterizing southern woods as industrial raw materials by analyzing their analytical, physical, chemical and mechanical properties.

All the project's research fits together in BRUSH (Biomass Retrieval and Utilization with Shaping-Lathe Headrigs)—a system that, it is claimed, can quadruple the utilization of wood from southern forests. In 1963, Koch explains, about 30 percent of the pine biomass (above and below ground) harvested in the South for lumber and pulp was actually recovered as salable product. Virtually none of the hardwoods on pine sites were used. BRUSH would recover 67 percent

of the biomass in both pines and hardwoods as solid wood products worth about \$150 per ton. Thus, product yield from a mixed-species forest would be four times that obtained in 1963 since hardwood tonnage on pine sites is nearly as great as pine. In addition, harvested logging slash and residues would provide most of the necessary fuel.

Some elements of BRUSH, including the tree puller and shaping-lathe headrig, are already in use by  
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## Peter Koch

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several companies, and Koch estimates that by the mid-1980's wood shortages will give impetus for widespread application of the idea in its entirety.

Koch is characterized by a sense of urgency, a drive that typically keeps him at work 60 hours a week. He is a man of deadlines, turning out a prodigious amount of work and giving his co-workers the freedom and motivation to do the same. Enthusiasm and energy are high in the project, which has won a Superior Service Award from the Department of Agriculture.

Koch himself has published over 100 scientific papers as well as two books, *Wood Machining Processes* and *Utilization of the Southern Pines*. Both books are standard references, and the pine text is now in its second printing. A third book, *Utilization of Hardwoods Growing on Southern Pine Sites*, is in the works.

In between the writing and the research, Koch travels, bringing his ideas to industry and other scientists. Between 1974 and 1976, he presented 78 papers at scientific and trade meetings in the U.S., Canada, Argentina, Australia, New Zealand, Norway and Finland.

A past president of the Forest Products Research Society, Koch helped to found the society's information retrieval system—Abstract Information Digest Service (AIDS). He is listed in *American Men of Science* and *Who's Who in America*. He has been named a fellow in the International Academy of Wood Science, a distinction shared by fewer than 100 scientists.

Koch was born in Missoula, Montana, in 1920. He earned a B.S. in mechanical engineering at Montana State College in 1942, then logged 1,000 hours as a combat pilot in China before completing his Ph.D. in wood science at the University of Washington in 1954.

He relaxes from his demanding work schedule with such equally demanding leisure activities as making a 1,000-mile solo canoe trip down the Yukon River, trekking across the Andes and exploring the upper reaches of the Congo River.

His wife, the former Doris Ann Hagen, shares his enthusiasm for the outdoors. Together they have navi-

gated rubber rafts and canoes down numerous Western rivers, sailed the coast of Maine, clambered on the slopes of Mount Kilimanjaro, flown the skies of Mexico and camped in Africa. Last year they rented a camper and drove 4,000 miles through Finland, Sweden and Norway. Now they are planning a walking trip in the Himalayas.

The secret to Peter Koch's success? Doris Koch sums it up: "We define our goals, consider our direction and, having done so, abundantly enjoy our passage." ■

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Cover—Baby screech owl. Photo by George H. Harrison.

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